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VOL 3 NO 4

# NAVAL MEDICAL SURVEILLANCE REPORT

# N M S R

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*Data in the NMSR are provisional, based on reports and other sources of data available to the Navy Environmental Health Center. Notifiable conditions are classified by date of report. Only cases submitted as confirmed are included.*

## COMMUNICABLE DISEASE

### EPIDEMIOLOGY – WHO NEEDS IT? PART II

In our last issue, Dr. Fleisher presented a historical overview of the necessity of epidemiology. We have come a long way from the days of the Broad Street pump, but have not always learned the lessons. Today's complex organizational environment sometimes prevents us from taking the time to conduct epidemiological studies using a systematic approach. Too often we learn that organizations and individuals engage in a study where there is no systematic review or support relating to the quality of epidemiologic methodology or statistical adequacy of activities undertaken. Epidemiological studies (or interventions) proceed without critical evaluation of the epidemiological methodology contained within the study design. Failure to conduct such critical evaluation prior to the start of the study or intervention can result in spurious associations or lack of an association where one exists.

Analyses of epidemiological studies or interventions must include control for competing risk factors and/or potential confounders through the use of appropriate multivariate statistical methodology. Databases must be carefully constructed. They are frequently non-representative of the target population studied. Analyses of databases are often inadequate in that they are overly simplistic or fail to account for these competing risk factors or potential confounders.

In order to provide the best possible health surveillance and related interventions to the populations served, systematic epidemiological support and review of methodological and statistical methods used for surveillance/interventions is necessary. This will ensure that the best possible service and science to your customers. Included should be the following elements: 1) assurance that health related interventions are based on the soundest epidemiological methods possible in order to avoid or minimize potential sources of bias occurring after the intervention is set in motion; 2) assurance that the best possible statistical evaluation of health related interventions by the use of the most appropriate statistical analyses; 3) assurance that the database represents the target population; and 4) provision of active oversight of the periodic analysis of all databases, making recommendations for using the most appropriate statistical procedures.

It must be emphasized that this effort can only come about through a system that is open and responsive to criticism, applies advances in methodology, and which continues to develop systems for quality improvement, thus resulting in continually improving the quality of science and customer service.

**Naval Medical Surveillance Report**

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## ADENOVIRUS ILLNESS IN DoD

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The sole manufacturer of adenovirus vaccines (types 4 and 7) ceased production in 1995, and all supplies of these vaccines ran out in late 1999. Since then, there has been a significant increase in adenovirus illness, including several large outbreaks at DoD recruit training bases, including the Navy's Recruit Training Center Great Lakes.

Information on the Navy Health Research Center's adenovirus surveillance efforts is available at http://pc176.nhrc.navy.mil/disease.

Adenovirus illness is usually mild to moderate in severity, causing lost training days for recruits, interrupted training cycles, and greatly increased health care workload during outbreaks. However, adenoviral illness can be severe, resulting in hospitalization and sometimes death. During 2000 there were two deaths in DoD trainees; both of these occurred during initial training at Great Lakes. Summaries of the two cases follow:

In June, a 19 year-old male was seen several times as an outpatient for acute respiratory disease. He developed lethargy and ataxic gait, was evaluated in the emergency room, and was admitted with a working diagnosis of viral encephalitis. He rapidly deteriorated, became comatose, and never recovered. Serum contained high titer complement-fixing antibody against adenovirus. He died in early July. After autopsy, brain and spinal cord were positive for adenovirus by PCR, and serum was positive for high titer antibodies to adenovirus types 2, 4, and 7. Pathology of brain and cord were consistent with viral encephalomyelitis. Central nervous system manifestations of adenovirus infection are not common, but are well known in the literature. This case serves a painful reminder of the uncommon, but sometimes very severe, consequences of adenovirus infection.

In September, a 21 year old male presented to the emergency room with fever and respiratory difficulty. Chest radiograph showed multiple patchy infiltrates which were thought to be consistent with viral pneumonia. The patient was admitted, deteriorated over several days, and died of adult respiratory distress syndrome. A sputum culture grew group A streptococci; viral cultures and serology were negative for adenovirus and other respiratory viruses. Initial PCR for adenovirus was negative. However, adenovirus was still considered a possible etiology because of the chest radiograph appearance and epidemiological links. Recently, a new commercially available PCR-EIA test for adenovirus was used at NHRC for the same samples. The result was positive, and repeat testing by CDC was also positive. This death is now also considered an adenovirus death.

Deaths from adenovirus have been reported in the literature from the pre-vaccine era. Now, Navy has had two confirmed adenovirus deaths in recruits in the first full calendar year after complete loss of adenovirus vaccines. It is impossible to predict whether we will continue to see deaths from adenovirus in the next several years. Certainly it is likely that we will have at least occasional severe cases of adenoviral illness. There were two severe, but non-fatal, cases of adenoviral pneumonia in December of 2000.

There are no reports of adenovirus outbreaks aboard Navy ships. Such outbreaks must be considered a possibility,

however, especially as the proportion of Sailors and Marines who did not receive the vaccines in initial training increases over the next several years. Acute respiratory disease outbreaks aboard ship can be explosive because of the tight living quarters and frequent close contact with many shipmates. All shipboard medical personnel should be on the lookout for early signs of a possible respiratory outbreak. Assistance with managing such situations can be obtained from one of the four Navy Environmental and Preventive Medicine Units, or from the Navy Environmental Health Center.

Efforts are underway in DoD to acquire replacement adenovirus vaccines against types 4 and 7. These vaccines are likely to be expensive, both because of the small total number of doses which will be needed (there is no civilian market for these vaccines) and because of the considerable start-up costs involved in any new vaccine. Even though similar vaccines were FDA approved in the past, the FDA testing process will be time consuming. The expected time before replacement vaccines are available is three to five years.

## EXPLOSIVE OUTBREAKS OF GASTROENTERITIS UNDERWAY

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Several comments seem warranted to amplify the discussion about the outbreak of Gastroenteritis Underway (NMSR Jan-Mar 2000, page 16). Large outbreaks of shipboard gastroenteritis are not common, but present a challenge for the onboard medical staff. Several similar incidents from aircraft carriers have been reported. After a North African port visit during 1988, a study from USS JOHN F. KENNEDY (CV 67) supported the significance of onshore food-borne sources (1). They detailed the impact on ship's medical requirements and ship's manpower availability. After a port visit in the Mediterranean during 1991, the medical department of USS FORRESTAL (CV 59) treated over 750 similar cases in a crew of 5,000 (2). Another ship in company treated 15% of the crew for diarrheal diseases, though no cause was established and a viral etiology was considered most likely. During Operation Uphold Democracy in 1994, one carrier reported 600 cases of gastroenteritis that were attributed to a viral etiology after other causes were excluded (3). Similar outbreaks have been reported from the civilian cruise ship industry, which is monitored by an office at the Centers for Disease Control in Atlanta, Georgia (4).

Several areas warrant special discussion. The data from the USS JOHN PAUL JONES (DDG 53) suggests that episodes will result in about 15% of the exposed crew receiving medical care in the first several days, which approximates findings from USS FORRESTAL in 1991. That medical demand places a significant strain on medical resources and shipboard operations. These incidents appeared to have been associated with port visits, though sanitation conditions ashore may be less important than other forms of transmission. The risk of diarrheal disease to shipboard personnel dictates a strong US Navy preventive medicine program. The ship's medical department personnel must be actively involved in monitoring food preparation and handling procedures, food service workers, and shipboard sanitation. Prior to port visits, preventive medicine briefings should include risks of diarrheal disease, particularly before high-risk port locations. Medical department manning, training and equipment must be able to

support the potential requirement from acute outbreaks of gastroenteritis in the shipboard environment. A significant outbreak of diarrheal disease poses a major challenge to the medical staff as well as the ship's command structure.

References:
1. Haberberger RL, Scott DA, Thorton SA, Yams KC. Diarrheal Disease Aboard a U.S. Navy Ship after a Brief Port Visit to a High Risk Area. *Military Medicine* 1994: 159: 445-448.
2. Bohnker B, McEwen G, Feeks E, Palombaro J. Explosive Outbreak of Gastroenteritis on an Aircraft Carrier: An Infectious Disease Mass Casualty Situation. *Aviat. Space Environ. Med*. 1993; 64:648-650.
3. Bohnker BK. Forward, .. From the sea: Navy Medicine Contributions to Operation Uphold Democracy. *Navy Medicine* 86. 3:8-11, May-June 1995.
4. Koo K, Malone K, Tauxe R. Epidemiology of Diarrheal Disease Outbreaks on Cruise Ships, 1986-1993. *JAMA* 1996: 275;545-547.

## CHRONIC DISEASE AND INJURY

### NAVY SUICIDE ACTIVITY

One of the most devastating Disease Non-Battle Injuries that occurs is suicide. Not only is a member's life lost but the effect is personally felt by those who know the individual as well as the entire ship or battalion. In order to better understand the reasons surrounding suicides within the Navy, the Bureau of Naval Personnel (BUPERS) began tracking the suicide activity among its active duty members.

The data was provided to the Navy Environmental Health Center by BUPERS. Figures 1 through 4 (pp.5, 8 and 9) show the demographics and the methods used in successful suicides by active duty Navy personnel.

Figure 1. overwhelmingly demonstrates that almost all successful suicides are carried out by males (95% versus 5%).

**Figure 1. Navy Suicide Activity, CY-99, by Sex**

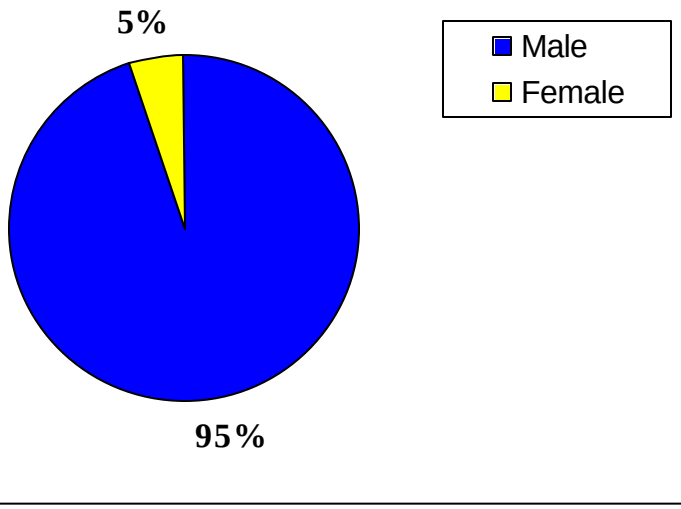



Figure 2. (p 8) delineates that the majority of these successful suicides occur within the Pacific Command (PAC = 44%) followed next by the Atlantic Command (LANT = 28%). Those who are in a training status are at 15%. (cont. page 8)

## NAVY DISEASE REPORTING SYSTEM (NDRS)

### SUMMARY OF 2000 DATA

Tables 1 and 2 display the Medical Event Reports (MERs) received at Navy Environmental Health Center (NEHC) as of 31 Dec 2000. Interested readers may calculate rates by dividing the frequencies by estimated mid-year strength of 373,193 for USN and 173,321 for USMC. Table 1 shows active duty only. Table 2 shows non-active duty beneficiaries.

**Table 1. Reportable Medical Events, Combined Navy & Marine Corps Active Duty, Case Frequencies, 1 Jan - 31 Dec, 2000**

| Disease | Total | USN | USMC | Disease | Total | USN | USMC |
|---|---|---|---|---|---|---|---|
| Amebiasis* | 2 | 2 | 0 | Lyme Disease | 5 | 4 | 1 |
| Anthrax* | 0 | 0 | 0 | Malaria (specify type) *1 | 11 | 7 | 4 |
| Biological warfare agent exposure | 0 | 0 | 0 | Measles* | 0 | 0 | 0 |
| Bites, rabies vaccine & human rabies immune | 49 | 39 | 10 | Meningitis (aseptic, viral) | 20 | 13 | 7 |
| Bites, venomous animal | 1 | 0 | 1 | Meningitis (bacterial other than Meningococcus) | 7 | 3 | 4 |
| Botulism* | 2 | 2 | 0 | Meningococcal disease* | 1 | 1 | 0 |
| Brucellosis | 0 | 0 | 0 | Mumps | 1 | 1 | 0 |
| Campylobacteriosis* | 28 | 25 | 3 | Occupational exposure to blood borne pathogens | 14 | 14 | 0 |
| Carbon Monoxide poisoning* | 0 | 0 | 0 | Onchocerciasis | 0 | 0 | 0 |
| Chemical warfare agent exposure | 0 | 0 | 0 | Pertussis* | 0 | 0 | 0 |
| Chlamydia | 1319 | 777 | 542 | Plague* | 0 | 0 | 0 |
| Cholera | 0 | 0 | 0 | Pneumococcal pneumonia | 5 | 1 | 4 |
| Coccidioidomycosis | 1 | 0 | 1 | Poliomyelitis* | 0 | 0 | 0 |
| Cold injuries | 0 | 0 | 0 | Psittacosis (Ornithosis) | 0 | 0 | 0 |
| Cryptosporidiosis* | 0 | 0 | 0 | Q Fever* | 0 | 0 | 0 |
| Cyclospora* | 0 | 0 | 0 | Rabies, clinical human* | 0 | 0 | 0 |
| Dengue fever* | 1 | 1 | 0 | Relapsing fever | 0 | 0 | 0 |
| Diphtheria | 0 | 0 | 0 | Rift Valley fever | 0 | 0 | 0 |
| E. Coli 0157:H7 infection* | 2 | 2 | 0 | Rocky-Mountain Spotted Fever | 3 | 3 | 0 |
| Ehrlichiosis | 0 | 0 | 0 | Rubella* | 0 | 0 | 0 |
| Encephalitis* | 0 | 1 | 0 | Salmonellosis* | 14 | 9 | 5 |
| Filariasis | 0 | 0 | 0 | Schistosomiasis | 0 | 0 | 0 |
| Giardiasis | 11 | 11 | 0 | Shigellosis* | 1 | 1 | 0 |
| Gonorrhea | 423 | 290 | 133 | Smallpox* | 0 | 0 | 0 |
| Haemophilus influenza, type b | 0 | 0 | 0 | Streptococcal disease, Group A | 3 | 2 | 1 |
| Hantavirus infection* | 1 | 1 | 0 | Syphilis | 21 | 14 | 7 |
| Heat injuries | 32 | 5 | 27 | Tetanus | 1 | 1 | 0 |
| Hemorrhagic fever* | 0 | 0 | 0 | Toxic shock syndrome | 0 | 0 | 0 |
| Hepatitis, A (acute, symptomatic only) | 0 | 0 | 0 | Trichinosis | 0 | 0 | 0 |
| Hepatitis, B (acute, symptomatic only) | 15 | 6 | 9 | Trypanosomiasis | 0 | 0 | 0 |
| Hepatitis, C (acute, symptomatic only) | 10 | 7 | 3 | Tuberculosis, pulmonary active* | 5 | 5 | 0 |
| Influenza (confirmed) | 0 | 0 | 0 | Tularemia* | 0 | 0 | 0 |
| Lead poisoning | 0 | 0 | 0 | Typhoid fever* | 0 | 0 | 0 |
| Legionellosis* | 0 | 0 | 0 | Typhus* | 0 | 0 | 0 |
| Leishmaniasis | 0 | 0 | 0 | Urethritis (non gonococcal) | 310 | 112 | 198 |
| Leprosy (Hansen's disease) | 0 | 0 | 0 | Varicella | 18 | 12 | 6 |
| Leptospirosis* | 0 | 0 | 0 | Yellow fever | 0 | 0 | 0 |
| Listeriosis | 0 | 0 | 0 | | | | |

***Reportable within 24 hours**

**Table 2. Reportable Medical Events, Combined Navy & Marine Corps Beneficiaries, Case Frequencies, 1 Jan - 31 Dec, 2000**

| Disease | Total | USN | USMC | Disease | Total | USN | USMC |
|---|---|---|---|---|---|---|---|
| Amebiasis* | 0 | 0 | 0 | Lyme Disease | 9 | 4 | 5 |
| Anthrax* | 0 | 0 | 0 | Malaria | 3 | 1 | 2 |
| Biological warfare agent exposure | 0 | 0 | 0 | Measles* | 0 | 0 | 0 |
| Bites, rabies vaccine & human rabies immune | 42 | 41 | 1 | Meningitis (aseptic, viral) | 26 | 16 | 10 |
| Bites, venomous animal | 0 | 0 | 4 | Meningitis (bacterial other than Meningococcus) | 12 | 10 | 2 |
| Botulism* | 0 | 0 | 0 | Meningococcal disease* | 4 | 4 | 0 |
| Brucellosis | 0 | 0 | 0 | Mumps | 1 | 1 | 0 |
| Campylobacteriosis* | 17 | 15 | 2 | Occupational exposure to blood borne pathogens | 0 | 0 | 0 |
| Carbon Monoxide poisoning* | 0 | 0 | 0 | Onchocerciasis | 0 | 0 | 0 |
| Chemical warfare agent exposure | 0 | 0 | 0 | Pertussis* | 2 | 2 | 0 |
| Chlamydia | 484 | 323 | 161 | Plague* | 0 | 0 | 0 |
| Cholera | 0 | 0 | 0 | Pneumococcal pneumonia | 7 | 6 | 1 |
| Coccidioidomycosis | 7 | 6 | 1 | Poliomyelitis | 0 | 0 | 0 |
| Cold injuries | 0 | 0 | 0 | Psittacosis (Ornithosis) | 0 | 0 | 0 |
| Cryptosporidiosis* | 0 | 0 | 0 | Q Fever* | 0 | 0 | 0 |
| Cyclospora* | 0 | 0 | 0 | Rabies, clinical human* | 0 | 0 | 0 |
| Dengue fever* | 0 | 0 | 0 | Relapsing fever | 0 | 0 | 0 |
| Diphtheria | 0 | 0 | 0 | Rift Valley fever | 0 | 0 | 0 |
| E. Coli 0157:H7 infection* | 1 | 1 | 0 | Rocky-Mountain Spotted Fever | 0 | 0 | 0 |
| Ehrlichiosis | 0 | 0 | 0 | Rubella* | 3 | 3 | 0 |
| Encephalitis* | 0 | 1 | 0 | Salmonellosis* | 50 | 43 | 7 |
| Filariasis | 0 | 0 | 0 | Schistosomiasis | 1 | 1 | 0 |
| Giardiasis | 15 | 15 | 0 | Shigellosis* | 3 | 3 | 0 |
| Gonorrhea | 85 | 67 | 18 | Smallpox* | 0 | 0 | 0 |
| Haemophilus influenza, type b | 12 | 10 | 2 | Streptococcal disease, Group A | 12 | 8 | 4 |
| Hantavirus infection* | 0 | 0 | 0 | Syphilis | 4 | 4 | 0 |
| Heat injuries | 0 | 0 | 0 | Tetanus | 0 | 0 | 0 |
| Hemorrhagic fever* | 0 | 0 | 0 | Toxic shock syndrome | 0 | 0 | 0 |
| Hepatitis, A (acute, symptomatic only) | 3 | 2 | 1 | Trichinosis | 0 | 0 | 0 |
| Hepatitis, B (acute, symptomatic only) | 3 | 2 | 1 | Trypanosomiasis | 3 | 2 | 1 |
| Hepatitis, C (acute, symptomatic only) | 0 | 0 | 1 | Tuberculosis, pulmonary active* | 14 | 12 | 2 |
| Influenza (confirmed) | 1 | 1 | 0 | Tularemia* | 0 | 0 | 0 |
| Lead poisoning | 1 | 1 | 0 | Typhoid fever* | 1 | 1 | 0 |
| Legionellosis* | 0 | 1 | 0 | Typhus* | 0 | 0 | 0 |
| Leishmaniasis | 0 | 0 | 0 | Urethritis (non gonococcal) | 0 | 0 | 0 |
| Leprosy (Hansen's disease) | 0 | 0 | 0 | Varicella | 0 | 0 | 0 |
| Leptospirosis* | 1 | 1 | 0 | Yellow fever* | 0 | 0 | 0 |
| Listeriosis | 1 | 1 | 0 | | | | |

*Reportable within 24 hours

(cont. from page 5)

**Figure 2. Navy Suicide Activity, CY 99, by Major Command**

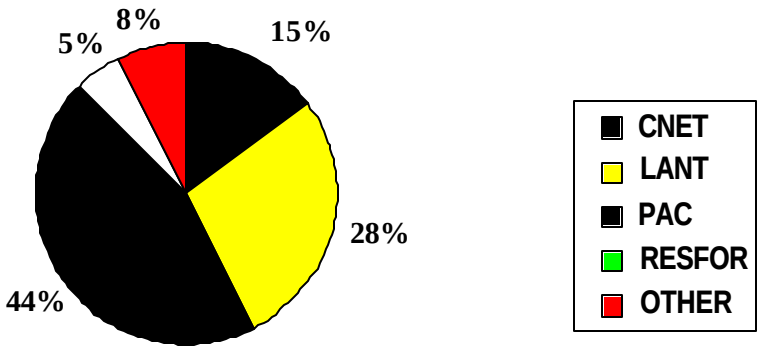



Figure 3. shows that the majority of suicides are committed by Whites (69%) followed next by African-Americans (20%). The remainder is by Asian-Pacific Islanders (8%) and Native Americans (3%).

**Figure 3. Navy Suicide Activity, CY 99, by Race**

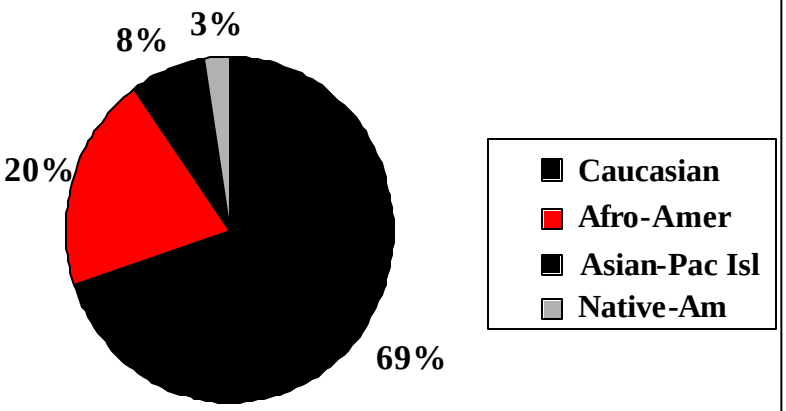



Figure 4. (p 9) describes the method used in the commission of the suicide. The majority of successful suicides were committed using a gun (52%). Hanging was the second highest method used by the victim (27%). Others methods used were fairly equally distributed at smaller percentages.

**Figure 4. Navy Suicide Activity, CY-99, by Method**

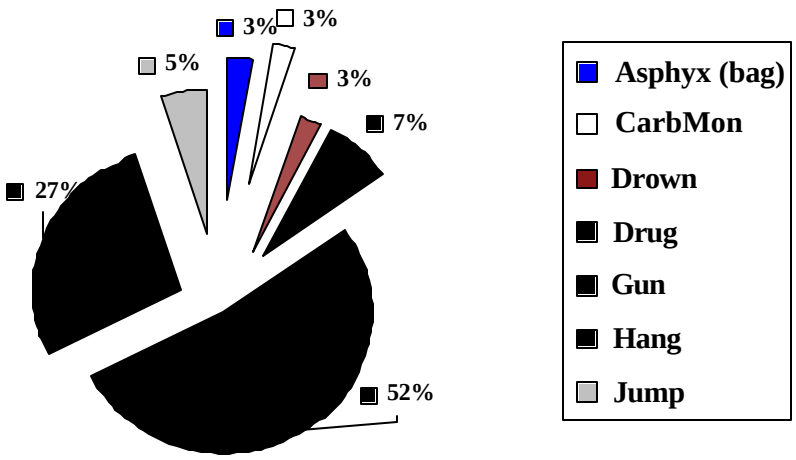
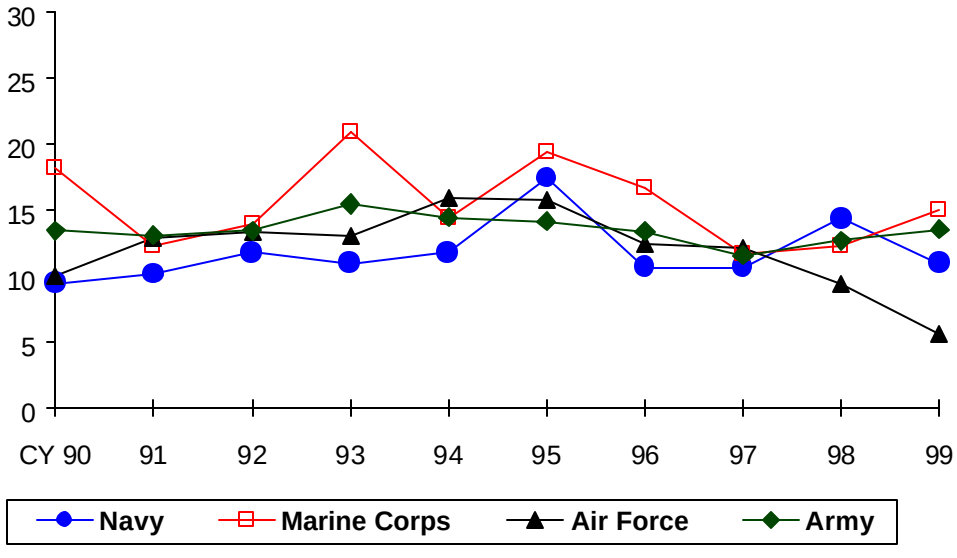



Figure 5. shows the suicide rate by Service for Calendar Years 1990 through 1999. U.S. Navy personnel in comparison to the other services for the majority of these years had the lowest rate of suicide. The only exceptions were the years 1995 where they had the second highest rate and 1998 where they had the highest rate among the four services. Marine Corps personnel have over this ten-year period consistently shown the highest rate of suicide among the four services. Of all the services the Marine Corps was the only one to attain a rate of ≥ 20/100,000. From 1995-1999 the Navy, Marine Corps, and Army personnel reveal a continuous "roller coaster" trend of suicides committed the Air Force has demonstrated a continuous downward trend.

**Figure 5. A Comparison of Suicide Rates, CY 90-99, by Service (Rate/100,000)**



## ANTHRAX VACCINE IMMUNIZATION PROGRAM (AVIP)

### ANTHRAX VACCINE ADVERSE EVENT REPORT SYSTEM (VAERS) UPDATE

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Table 1 displays the total Anthrax Vaccine Adverse Event Reporting System (VAERS) reports submitted through 29 Dec 2000. The source of this data is the Army Medical Surveillance Activity (AMSA).

***Editor's Note**: Dover AFB continues to submit the largest proportion of post-anthrax adverse event reports to the USAF POC (AFIERA/RSRH) using the VAERS systems. Although over-reporting due to media attention and negative press has been suggested, no conclusive studies have been performed to rule out other factors. However, the total amount of post-anthrax adverse event reports received by AFIERA/ RSRH has decreased significantly by all sites since the manufacture of new anthrax vaccine had ceased in CY2000*.

**Table 1. Cumulative Data (date 28 Aug 1998 - 29 Dec 2000)**

| Service | VAERS Report Required | | Classification | | | | |
|---|---|---|---|---|---|---|---|
| | | | Local Reaction | | | Systemic Reaction | Cum. Totals |
| | Yes | No | Mild | Moderate | Severe | | |
| USA | 13 | 101 | 14 | 23 | 13 | 64 | 114 |
| USN | 4 | 69 | 6 | 7 | 8 | 52 | 73 |
| USAF | 30 | 403 | 28 | 48 | 28 | 329 | 433 |
| USMC | 2 | 26 | 1 | 6 | 2 | 19 | 28 |
| USCG | 0 | 1 | 0 | 1 | 0 | 0 | 1 |

**Excludes 4 ODS/DS VAERS Reports on Anthrax and Non-DoD Reports**

## GLOBAL SURVEILLANCE OF EMERGING DISEASES

### A FINAL SUMMARY OF 2000 WEST NILE VIRUS ACTIVITY IN THE UNITED STATES, AND SURVEILLANCE ACTIVITY ON NAVY AND MARINE CORPS INSTALLATIONS

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An orientation to West Nile Virus (WNV) and a short description of calendar year 2000 surveillance activities have been provided in earlier NMSR issues. By the end of the mosquito activity season, much additional information has been gained from surveillance activities.

In CY2000, virus activity was documented in 12 states, from Connecticut and New Hampshire south to North Carolina. Human cases (19, 1 fatal) were documented in New York, New Jersey, and Connecticut. Patients were 36 – 87 years old (mean 62). Veterinarians identified severe disease in 65 horses, and 4139 dead birds (76 species) were verified WNV-positive.

The virus was found in 470 mosquito pools from five states, including New York, New Jersey, Pennsylvania, Connecticut, and Massachusetts. Most were *Culex pipiens, C. restuans, or C. salinarius.* Virus-positive *Aedes vexans, A. albopictus, Ochlerotatus (recently split from Aedes) japonicus, O. triseriatus, O. trivitattus, Culiseta melanura, Psorophora ferox,* and *Anopheles punctipennis* were collected. Importance of these species in transmission has not been established, though *C. pipiens* is clearly important in transmission in Europe and the Middle East.

Although the distribution of WNV increased significantly in 2000 from the area affected in 1999, and surveillance efforts were multiplied, there were far fewer human cases this summer. The Centers for Disease Control (CDC) note that all reported severe human cases occurred after WNV infected dead birds had been reported in their county of residence (1). This is evidence that wild birds are effective sentinels, though sentinel chicken flocks have not been a useful predictor of virus activity.

During this season, entomologists from Navy Disease Vector Ecology and Control Center, Jacksonville, Florida, and Navy Environmental and Preventive Medicine Unit TWO, Norfolk, Virginia, worked with personnel on Navy and Marine Corps installations to assess the bases' mosquito surveillance and control programs and emphasize increased suspicion in diagnosis of human illness and in dead bird surveillance. They visited 37 of 39 naval activities, and found that 87% had well established mosquito surveillance and control programs. During the 2000 mosquito breeding season, only 14 of those installations provided any mosquito surveillance data. For the entire 2000 season weekly human illness data submitted to Navy Environmental Health Center indicated no WNV cases in Navy and Marine Corps active duty personnel, dependents, or retirees in the military medical system.

Because the disease has spread geographically and in animal populations, increased diligence in mosquito control and in human surveillance will be justified in the upcoming season. Though our young active duty population is at very low risk of severe illness, continued effort to better understand the biology and predict the impact of this disease will be required.

Reference:
1. *Morbidity and Mortality Weekly Report,* November 24, 2000, 49(46), pp 1044-1047.

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